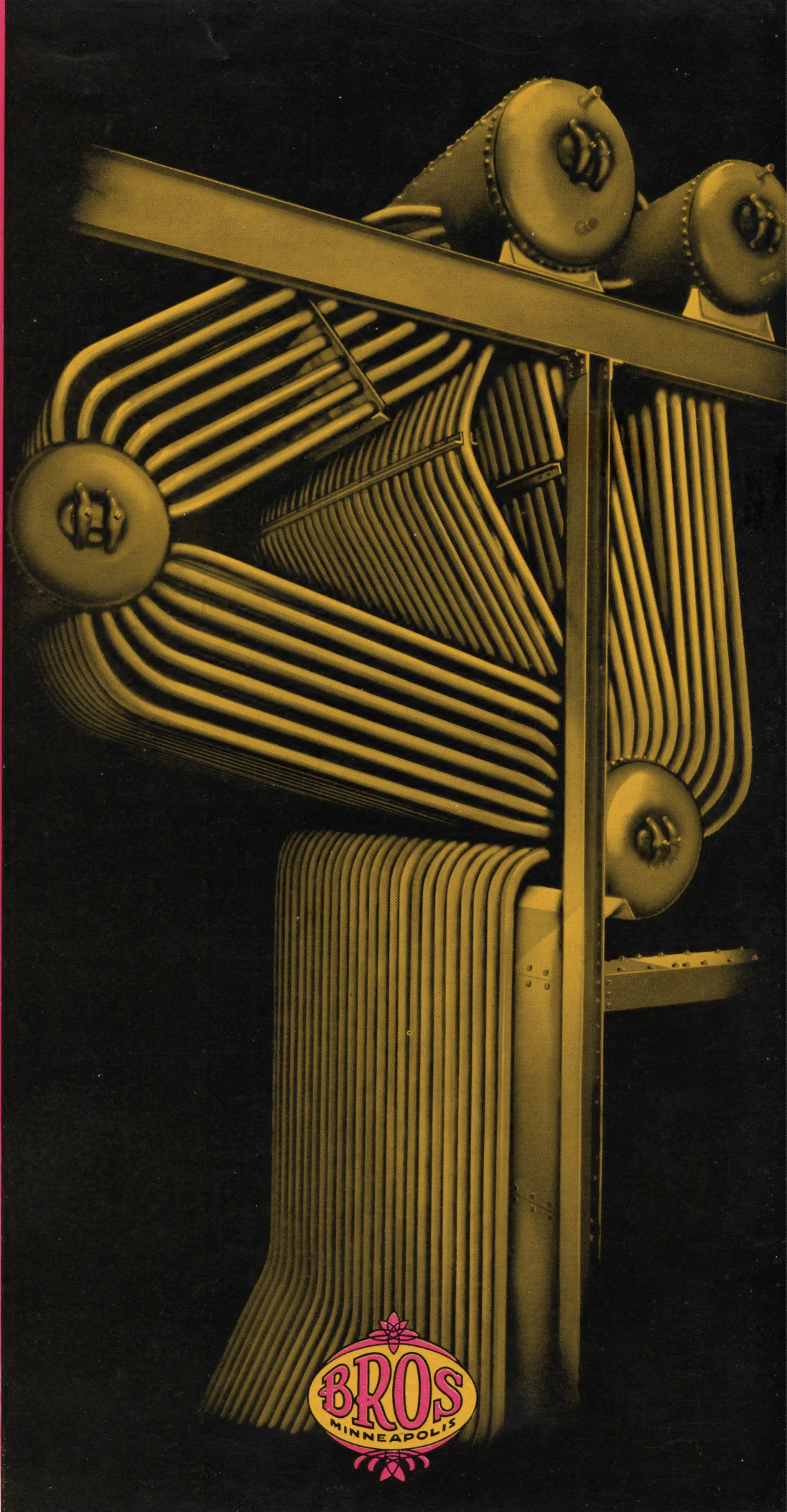


*Heating*  
*the*  
**UNIVERSITY**  
*of*  
**MINNESOTA**





**A** **BROS-WETHERBEE** four-drum bent tube boiler is the latest addition to the heating plant of the University of Minnesota. Formerly two 750 H. P. Heine Boilers, two 300 H. P. Keeler Boilers and six 300 H. P. Babcock and Wilcox Boilers comprised the steam generating equipment.

A **BROS** bridge-wall water-wall with Detrick air cooled side and front walls and a Strong-Scott "Unipulvo" constituted the balance of the installation. In selecting the **BROS-WETHERBEE** Boiler, the Pillsbury Engineering Company and University Engineers recognized the claims of the **WM Bros Boiler and Mfg. Co.**: That correct application of the laws of heat transmission and a 100% ring flow circulation with an integral economizer would insure a boiler installation capable of higher efficiencies and better operating characteristics.

A Standard A. S. M. E. Boiler test conducted by Professor Charles F. Shoop of the Experimental Department substantiated the judgment of the University Engineers and Consulting Engineers in selecting the **BROS-WETHERBEE** Boiler. The guaranteed efficiencies were exceeded and the operating characteristics of the boiler were far superior to any other bent tube or straight tube boiler.

### **Bros-Wetherbee Design**

The **BROS-WETHERBEE** Boiler is **DIFFERENT** in design than any other boiler. The dropping of the submerged drum to a low

level permits a complete deviation from the conventional and time worn design of water-tube boilers. The standard "V" type boiler has only **ONE** gas pass **PARALLEL** to the tubes in the steam generating leg, while the **BROS-WETHERBEE** has **THREE** passes, all of which are **ACROSS** the tubes. The conventional boiler has only **ONE-THIRD** of the tube area in the steam generating circuit, while the **BROS-WETHERBEE** has almost **TWO-THIRDS**. It necessarily follows different operating characteristics and different results are obtainable with a boiler of such outstanding differences of construction.

### **Flue Gas Temperatures**

Test readings of the flue gas temperatures averaged 150° lower at all ratings than the temperatures recorded on another standard well known boiler recently installed in the University of Minnesota heating plant.

Lower flue gas temperatures are a direct and constant saving in cost of steam generation and are characteristic of the **BROS-WETHERBEE** Boiler.

### **Draft Losses**

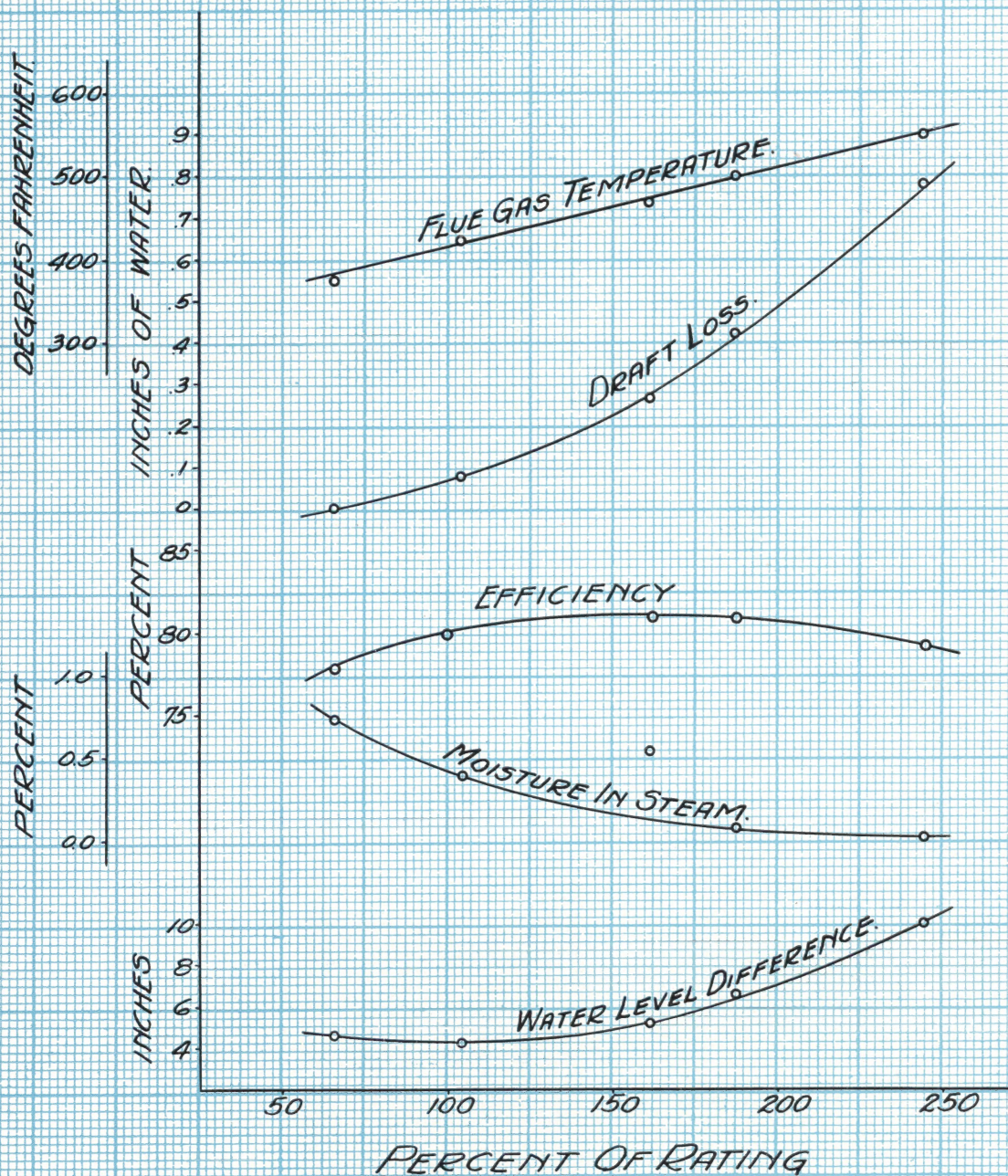
The test proved that draft losses were less than usually found in four-drum boiler installations and were lower than the standard draft loss guarantees.

Ordinarily, with such a long and severe gas travel higher draft losses would be expected,





**CHART OF TEST**  
**BROS WETHERBEE WATERTUBE BOILER**  
 INSTALLED AT  
 HEATING PLANT, UNIVERSITY OF MINNESOTA, MINNEAPOLIS, MINN.



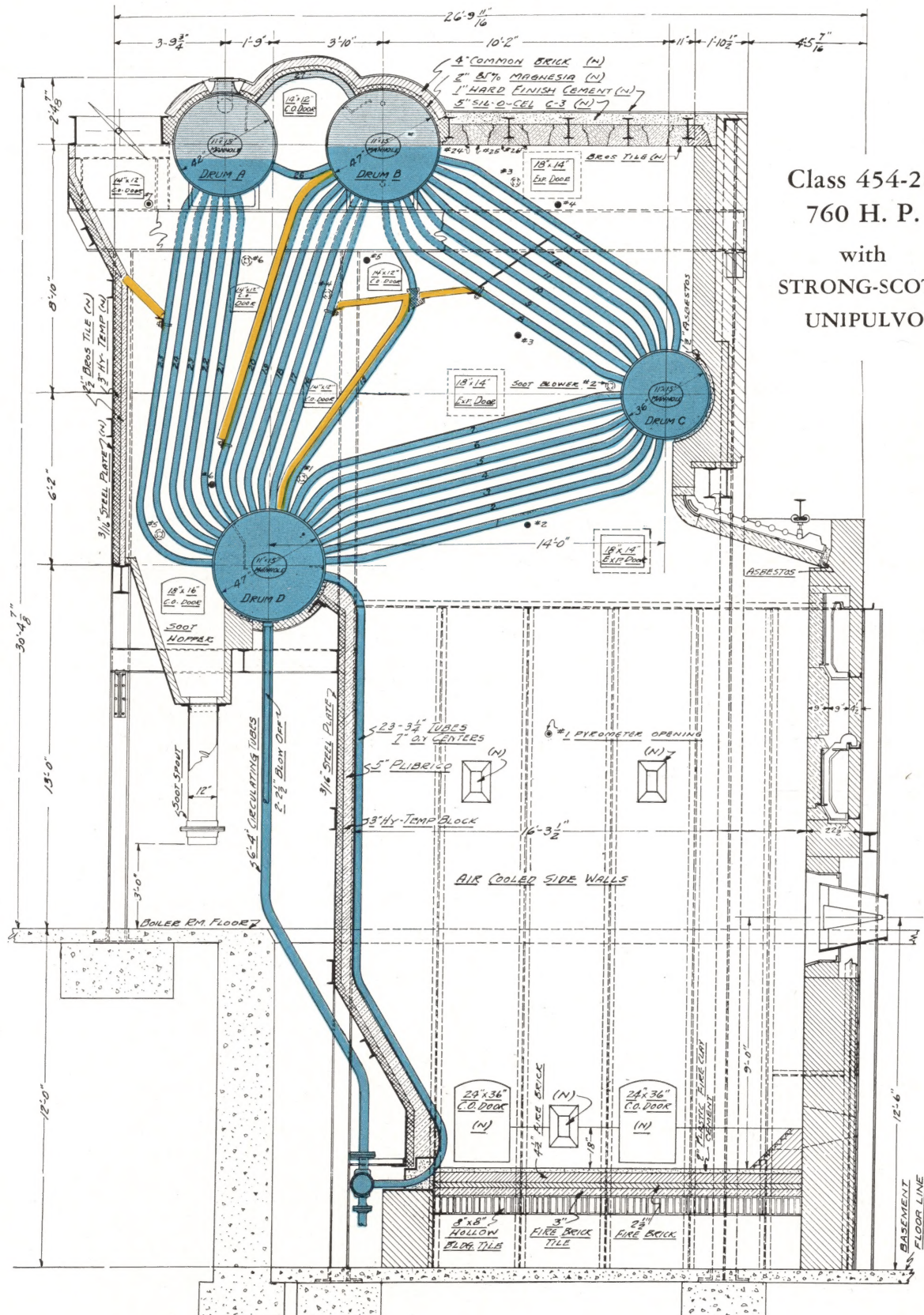
CLASS 454-28-760 H.P.  
 WITH  
 STRONG SCOTT UNI-PULVO



# BROS-WETHERBEE WATERTUBE BOILER

INSTALLED

Heating Plant, University of Minnesota, Minneapolis, Minnesota



Class 454-28

760 H. P.

with  
STRONG-SCOTT  
UNIPULVO



but the careful baffle design in the BROS-WETHERBEE Boiler enables the gases to sweep through the boiler with a minimum of friction.

BROS-WETHERBEE Boiler design precludes the possibility of dead gas spaces and the bottling of gases in the gas travel.

## Dry Steam

The BROS-WETHERBEE Boiler generated commercially dry steam up to the maximum test rating of 250%. A steam pressure pen connected to the main steam line and a steam temperature pen connected to a throttling calorimeter recording on the same chart gave a continuous reading of the percentage of moisture content at all times. The highest moisture content for any test was .7 of 1%. At high ratings a 4° super heat was maintained.

The test proved that the BROS-WETHERBEE Boiler with its 100% ring flow circulation, large steam drums and correct steam baffling can and will produce dry steam at all ratings.

## Water Level

The 100% Ring-Flow circulation in the BROS-WETHERBEE Boiler maintained at all ratings a water level difference between the two steam drums at a minimum and a practically constant water level difference at all ratings above 125%. The tubes from the rear steam drum were completely covered by water at all times and provided more than an ade-

quate supply of water for the economizer bank of tubes.

At normal ratings the water level difference between the steam drums was 4 inches; at 125% rating to 250% rating the water level difference was practically constant at 7 inches.

## Efficiency

Under test the desirable operating characteristics and the high efficiency of the BROS-WETHERBEE Boiler proved that boiler design is far better than any other competitive boiler.

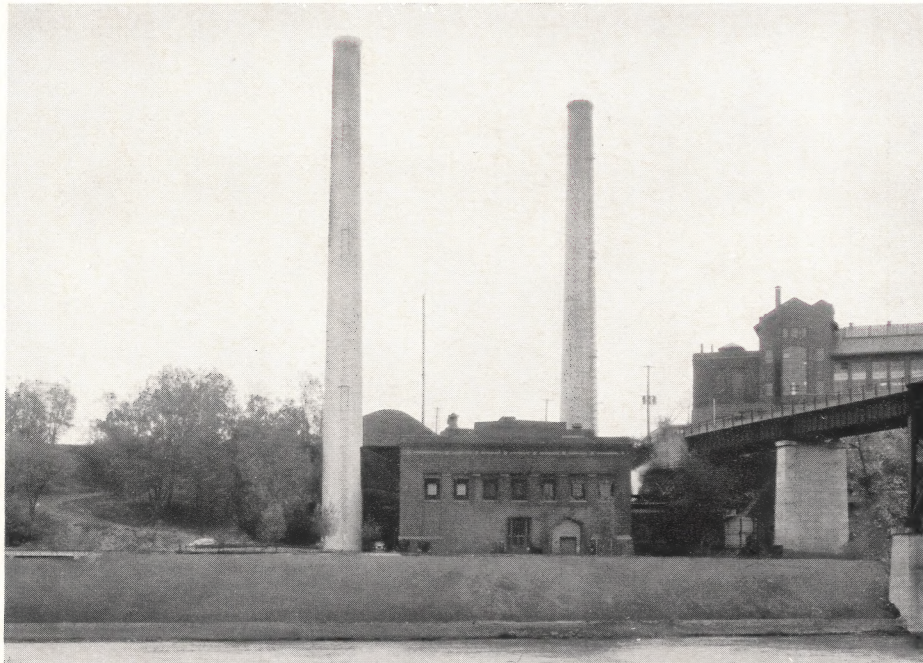
Its constant water level insures a minimum of attention under varying loads; it exceptionally dry steam provides a steady, constant quality low moisture content steam for any superheater or prime mover; its draft requirements permit installation in average boiler rooms without chimney alterations; and its low flue gas temperatures insure a substantial reduction in the cost of steam generation.

An examination of the chart indicates that the efficiency curve is no "hair pin" curve with sharp drop over 200% rating. From 75% rating to 250% rating the boiler can be operated with efficiencies close to 80%. Under favorable load conditions, the boiler will operate at efficiencies better than 80%.

The BROS-WETHERBEE Boiler is preeminently the pioneer in better boiler design and lower cost of steam generation.







**UNIVERSITY OF MINNESOTA  
HEATING PLANT**

**WM BROS BOILER & MFG. COMPANY**  
**MINNEAPOLIS • MINNESOTA**